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STUDIES OF THE ACUTE DIARRHEAL DISEASES [1]

VI. NEW PROCEDURES IN BACTERIOLOGICAL DIAGNOSIS

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The first paper of this series called attention to the superiority of the more highly selective culture media for the isolation of *Shigella dysenteriae* (*1*). We reported that the addition of one plate of desoxycholate-citrate to three plates of less selective media increased the isolations by 75 percent in cases, and by 314 percent in carriers. Irons and associates (*2*), Coleman (*3*), Mayfield and Gober (*4*), and Anderson and Cruickshank (*5*) have reported confirmation of our findings as to the efficacy of highly selective media.

We have, in the course of other studies, continued to evaluate culture media. Since January 1940, we have used continuously a new preparation, S. S. (Shigella-Salmonella) agar, first as an experimental medium submitted for trial, and later as purchased in the open market. The comparative efficiency of this and the desoxycholate-citrate medium in the culturing of fecal specimens collected in three widely separated areas is shown in table 1. Both preparations provided excellent results, but consistently the newer S. S. agar yielded a significantly greater number of positive isolations than the desoxycholate-citrate medium. Butterfield and Burns [2] report that freshly isolated Shiga strains grew luxuriantly on S. S. agar but that colonies on the desoxycholate-citrate could be seen only with the aid of a hand lens.

The full value of either of these highly selective media is obtained only when the whole surface is inoculated with the maximum amount of fecal material which will yield isolated colonies. The inoculum may be smeared quite freely on these preparations. Specimens submitted in glycerine-saline preservative are plated with a 24- or 26-gage nichrome needle bent so the terminal 1 cm. will be flat on the

[1] From the Division of Infectious Diseases, National Institute of Health, and the DeLamar Institute of Public Health, Columbia University.

[2] Personal communication from C. T. Butterfield and W. E. Burns.

surface of the medium when the handle is at a convenient working angle. The whole surface is seeded and the amount of inoculum varied by streaking in two to four segments. Cultures obtained with a rectal swab as described below are plated by "painting" the entire surface with the feces-coated swab.

TABLE 1.—*The relative effectiveness of desoxycholate-citrate and S. S. agars in isolating Shigella dysenteriae from fecal specimens*

Variety of *Shigella*	Total positives	Number and percent of total isolations from specified media									
		D. C.[1] and S. S.[2]		D. C. only		S. S. only		Total D. C.		Total S. S.	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Flexner	328	204	62	44	13	80	25	248	76	284	87
Newcastle	72	38	53	12	17	22	30	50	69	60	83
Sonne	278	177	64	39	14	62	22	216	78	239	86
Total	678	419	62	95	14	164	24	514	76	583	86

[1] Desoxycholate-citrate medium.
[2] S. S. (Shigella-Salmonella) agar.

A high proportion of the colonies are differentiated most clearly after 18 to 24 hours' incubation, but some, particularly on the desoxycholate-citrate agar, develop more slowly. Colonies having the characteristics of pathogenic organisms at 18 to 24 hours may become slightly pink, especially on the S. S. agar, after further incubation. For these reasons, we pick all plates after 18 to 24 hours and reexamine on the following morning. The clear, colorless colonies are readily seen on a satisfactory plate. If the medium has become cloudy, as it does with the growth of organisms occasionally present in feces, the size, shape, and transparency of the colonies must be considered. We make liberal use of Krumwiede's triple sugar agar to provide the preliminary differentiation of organisms giving suspicious colonies. In picking it must be remembered that a heavy inoculum is placed on these media. The growth of most nonpathogens is inhibited but they may remain viable. The inoculated surface must be regarded as a contaminated surface. Selected colonies are picked by merely touching the elevated center with the needle, not by a "scooping" motion. Cultures so picked are rarely, and never heavily, contaminated. This does not significantly confuse the reading of the reaction in Krumwiede's medium. However, all cultures should be plated for purity before proceeding with the detailed cultural and serological studies.

The need for a simplified procedure for obtaining fecal cultures became apparent in our study of institutional inmates. A rectal swab technique devised for these groups has been found to be more widely applicable.

It is difficult and painful to insert a dry sterile swab past the anal sphincter; it is easy and painless to insert a small, lubricated rubber tube. The method which we have adopted is to insert the dry swab contained within the lumen of the lubricated tube. The necessary materials are inexpensive and readily available. Gum rubber tubing (0.5 cm. inside and 0.8 cm. outside diameter) is purchased in bulk and cut into 12 cm. lengths. One end is beveled for about 1 cm. Cotton swabs are prepared on the usual wooden applicators but the cotton must be wound tightly, the end covered completely, and it must pass readily into the lumen of the tube. For use the swab is placed in the rubber tube with its tip slightly short of the beginning of the beveled opening. The external surface of this end of the tube is lubricated. The jelly should not reach the swab nor cover the opening. With the patient in a convenient position the unit is very easily inserted past the sphincter and up about one-half the length of the tube. The swab is exposed by withdrawing the tube 2 to 3 cm. The specimen is collected by rotating the applicator while sweeping it in a circular motion. The swab is then drawn back into the tube and in this position removed from the patient. The rubber tube and swab are separated and the latter is immediately used for plating, as described above. Later the tubes are boiled, washed, sterilized, and stored for future use. One precaution must be observed in collecting specimens from individuals with a watery diarrhea; the rubber tube must be compressed between the fingers to prevent an undesired discharge of fecal material.

We have used this method of obtaining cultures extensively in the study of institutional inmates. The specimens may be obtained as desired and the culture medium is inoculated with no delay whatsoever. It is also a rapid procedure. Two workers, with the assistance of available attendants, can readily obtain and plate 100 to 125 specimens per hour. Rectal swabs are convenient for hospitalized cases and have been used for the study of men in military barracks. Nurses may be permitted to collect specimens in this way from individuals ill at home. The limitations of the method are determined chiefly by the psychological reactions of the patients and the convenience of the workers concerned.

The highly selective culture media and this rectal swab technique for obtaining cultures have simplified our bacteriological studies, made it possible to expand our work, and have increased the proportion of positive observations.

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STUDIES OF THE ACUTE DIARRHEAL DISEASES [1]

VII. CARRIERS OF *SHIGELLA DYSENTERIAE*

By JAMES WATT, *Passed Assistant Surgeon*, ALBERT V. HARDY, *Surgeon* (R), and THELMA M. DECAPITO, *Junior Bacteriologist, United States Public Health Service*

Evidence concerning carriers of *Shigella dysenteriae* has been obtained in various ways during our studies. The complete description of these investigations will be presented in subsequent papers. At present certain data are being reported because recent advances in chemotherapy have demonstrated their practical importance in control.

The essential elements of our bacteriological procedures have been stated in previous papers of this series. The development of the highly selective desoxycholate-citrate and S. S. (Shigella-Salmonella) agars made it possible to obtain more dependable evidence concerning carriers of *Shigella dysenteriae*. Without these media, carriers of these organisms would be identified rarely; with them, they can be found frequently and with relative ease.

The designation "convalescent carrier" is used for individuals who harbor *Shigella* following recovery from an illness known to be due to this cause or following a diarrheal illness not known to be due to any other cause. The relationship between the infection and the disease was accepted only if the carrier was recognized within 3 months after the termination of the illness, but, once identified, the person was considered to be a convalescent carrier up to 1 year after recovery if the same variety of *Shigella* was harbored. "Passive carrier" signifies a culturally positive individual who had no history of diarrheal disease within the 3 months preceding the date of the first positive test or if, when an attack had occurred, the illness was proved to be other than *Shigella* infection. The term "chronic carrier" is used, as in typhoid, for any carrier state known to have continued for more than 1 year.

[1] From the Division of Infectious Diseases, National Institute of Health, with the cooperation of the departments of public health of those areas in which the studies were conducted, the Indian Medical Service, and the DeLamar Institute of Public Health, Columbia University.

CONVALESCENT CARRIERS

During 1938 in New Mexico, serial stool cultures during illness and after recovery were obtained from 103 culturally proved cases of bacillary dysentery. Routinely specimens were collected at weekly intervals until the individual had three consecutive negative examinations. Almost all of these patients were at home and there were inevitable breaks in the prescribed routine. However, the presence or absence of the convalescent carrier state was determined in all, and its approximate duration in all but 9 of the proved carriers. There are certain recognized limitations to these data. The duration of illness and convalescence could not be fixed with certainty. The best estimate determined by careful questioning was used. The collection of specimens depended on the voluntary cooperation of the families concerned, and weekly cultures were the most that could be obtained. Measurement of the period of infection by these relatively infrequent examinations gives an average interval shorter than the actual duration. Furthermore, in this series, 9 cases which had been followed for several weeks were still positive when the study terminated or when they ceased to provide specimens.

In this group of 103 positive cases, 82 (80 percent) convalescent carriers were found. The remaining 21 (20 percent) had positive cultures during illness only. The absence of infection after recovery was well established in 5 cases by negative tests in the final days of illness or in the early days after recovery. Follow-up specimens were not collected from the remaining 16 until 7 to 14 days after recovery. Probably at least some of these were carriers during the first week after recovery, thus increasing even beyond 80 percent the total percentage of convalescent carriers.

The duration of infection with symptoms and after recovery is shown in table 1. For all cases, the average duration of infection with symptoms was 11 days and the average minimum duration of infection after recovery 27 days. Known convalescent carrier states continued for an average of 34 days. The total period of illness was about equally divided between the time of acute symptoms and that of subsidence to complete recovery. Thus the duration of the convalescent carrier state was approximately 6 times as long as the acute stage of the illness and about 3 times as long as total illness.

The average length of illness due to Flexner infection was more prolonged than that due to Sonne or Newcastle, as were the periods of infection after recovery.

Table 2 shows the variation in the persistence of the convalescent carrier state for the different organisms. It was more common for infections with both Newcastle and Sonne to terminate in the first week after recovery than was true of Flexner types. The duration

beyond this varied widely with no significant difference by type of organism.

TABLE 1.—*Frequency of occurrence of the convalescent carrier state in proved cases of Shigella dysenteriae infection with a comparison of the duration of infection in illness and after recovery*

Observation	Variety of *Shigella*			
	Flexner	Newcastle	Sonne	Total
Cases:				
Studied by serial cultures	57	28	18	103
Became convalescent carriers:				
Number	45	21	16	82
Percent	79	75	89	80
Did not become convalescent carriers	12	7	2	21
Duration of carrier state determined	38	20	15	73
Duration of carrier state unknown	7	1	1	9
Duration of *Shigella* infection:				
With symptoms:				
Total days	758	191	137	1,086
Average per case	13	7	8	11
After recovery:				
Total days	1,584	549	375	2,508
Average per case [1]	32	20	22	27
Average per known carrier	42	27	25	34

[1] Exclusive of those in which the duration of the carrier state was unknown.

The frequency of the convalescent carrier state was further shown by findings on 163 other positive cases in New Mexico in 1938 which were not followed by serial cultures. One or more cultural examinations were made during the month following recovery and 110 (67 percent) were found to be carriers.

TABLE 2.—*Persistence of the convalescent carrier states, by variety of Shigella*

Week after recovery	Number and percentage of convalescent carriers positive during and later than the specified period							
	Variety of *Shigella*						Total	
	Flexner		Newcastle		Sonne			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	38	100	20	100	15	100	73	100
2	32	84	10	50	9	60	51	70
3	30	79	8	40	7	47	45	62
4	25	66	8	40	6	40	39	53
5	22	58	6	30	4	27	32	44
6	17	45	6	30	2	13	25	34
7	15	39	5	25	2	13	22	30
8	15	39	3	15	2	13	20	27
9	11	29	2	10	1	7	14	19
10	9	24	2	10	1	7	12	16
Over 10	4	11	2	10	1	7	7	10

These data show that convalescent carriers occur commonly and that individuals recovered from diarrheal disease may continue to disseminate the infection for days, weeks, or even months.

PASSIVE CARRIERS

Evidence concerning passive carriers was obtained by survey examinations of general population groups and of institutional inmates. Records concerning present and past diarrheal disorders were secured when the specimens were collected. The data as to clinical disease for individuals found culturally positive were checked by the medical epidemiologist during the completion of a detailed epidemiological report.

A total of 6,324 survey examinations were performed in New Mexico, Georgia, and Puerto Rico on individuals who stated that they had had no diarrheal disorder during the preceding year and 239 (3.8 percent) were positive for *Shigella dysenteriae* (table 3). The proportion was low in individuals under 1 year of age when almost all infections resulted in illness. It was fairly high during ages 3 to 9, but the striking feature of the age distribution was the relative uniformity of the passive carrier rates above the first year. There were variations by locality, by season, and by sex, as will be shown in the subsequent detailed report. The findings for these three regions were in marked contrast to those in New York City, where only 2 (0.1 percent) carriers were found among 1,659 persons examined.

TABLE 3.—*Prevalence of passive carriers of Shigella dysenteriae in healthy population groups with no history of diarrhea in the preceding year. Surveys made in New Mexico, Georgia, and Puerto Rico*

Age	Cultural examinations	Positive for *Shigella dysenteriae*		Age	Cultural examinations	Positive for *Shigella dysenteriae*	
		Number	Percent			Number	Percent
Under 1	328	2	0.6	20–24	471	23	4.9
1	136	6	4.4	25–34	818	20	2.4
2	183	7	3.8	35–44	621	20	3.2
3	200	12	6.0	45 and over	833	18	2.2
4	180	13	7.2	Unknown	302	4	1.3
5–9	1,076	73	6.8				
10–14	733	26	3.5	Total	6,324	239	3.8
15–19	443	15	3.4				

The occurrence of carriers among other population groups was studied as follows: (1) For 20 months cultures were made every 2 weeks on all members of a study group averaging 243 feeble-minded inmates. The prevalence of carriers varied from none to a maximum of 22 percent. Many individuals became infected more than once. In all, 312 infections were discovered in individuals who were and had been free of clinical disease due to *Shigella dysenteriae* for at least 3 months, a rate of 77 "carrier infections" per 100 inmates per annum. (2) In other institutions in which diarrheal disorders were occurring relatively high carrier rates were found. (3) Family contacts of positive cases had particularly high rates as, for example, 28 percent

passive carriers in New Mexico in 1937. (4) Similar data were obtained in the investigation of endemic diarrheal disease in a small military unit. Ten percent of the men who were on duty and officially well were culturally positive.

CHRONIC CARRIERS

Our investigations have been conducted in four widely separated and differing regions and we obtained only limited information concerning chronic carriers. Cases diagnosed in New Mexico in 1937 and retested in the summer of 1938 gave no evidence of prolonged carrier states. One patient in an institution was followed for more than a year before she ceased to discharge *Shigella*. Other persons are known to have had recurrent attacks with the same variety of organism for more than 1 year. These individuals have been exceptional cases in our experience. This fact, combined with evidence that this infection can be maintained by a constantly changing group of infected individuals, indicates that chronic carriers are of little importance in the spread of *Shigella dysenteriae*.

IDENTIFICATION AND CONTROL OF CARRIERS

It was found repeatedly that carriers outnumbered currently occurring cases. Thus the importance of carriers in the dissemination of infection is apparent. The practical significance of this information depends upon the practicability of their identification and control.

Approximately two-thirds of all *Shigella dysenteriae* infections found through our surveys were current or recent cases or household contacts of cases of diarrhea. During the seasonal peak of diarrheal disorders an even greater proportion (five-sixths) of carriers were found in families giving a history of diarrhea. Carriers may be discovered through effective diagnostic examinations of clinical cases and of their household or other intimate contacts. A program for the cultural examination of cases and contacts would be practicable for general population groups with adequate medical and public health services. Comparable procedures could be applied readily in institutions or military units. The ease of obtaining cultures from such controlled population groups would more than counterbalance the necessity of testing substantial numbers of contacts.

The high prevalence of carriers and the frequently prolonged duration of this infection make it impracticable to effect control by isolation until spontaneous bacteriological recovery. Recently the problem of control has been simplified by chemotherapy. Now *Shigella dysenteriae* infections in both the individual and in groups can be terminated promptly. Data leading to this conclusion are presented in chapter VIII, which follows.

CONCLUSION

Convalescent and passive carriers of *Shigella dysenteriae* occur commonly. A large proportion of them may be identified with relative ease if cases of diarrheal disease and their contacts are promptly studied by the use of the new highly selective culture media.

STUDIES OF THE ACUTE DIARRHEAL DISEASES [1]

VIII. SULFAGUANIDINE IN THE CONTROL OF *SHIGELLA DYSENTERIAE* INFECTIONS

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Marshall and coworkers, Lyons, Suarez and Hernandez, and Anderson and Cruikshank (*1, 2, 3, 4*) have reported on the use of sulfaguanidine in the treatment of bacillary dysentery. Our experience has provided evidence in support of their conclusions that this is a promising therapeutic agent. In known positive cases treated with sulfaguanidine the promptness of bacteriological recovery was particularly impressive. It seemed possible that carriers would respond to similar treatment. If they did the implications for control were apparent. Thus our observations, as reported here, were designed primarily to determine the possible value of sulfaguanidine in the control of *Shigella dysenteriae* infections.

OBSERVATIONS

Most of the individuals whom we have treated were inmates of a mental hospital. Clinical cases of *Shigella dysenteriae* infection were found by bacteriological examination of individuals with diarrhea; carriers were identified by cultural surveys. Most of the cases and all of the carriers admitted to the study were cultured daily for 3 days before the beginning of treatment, and all were tested daily throughout the period of treatment. Follow-up examinations were performed for at least 1 week and usually for 2 weeks thereafter. Cultures were taken by the rectal swab technique described in chapter VI of this series. Cases or carriers were included in the analysis if positive on the day treatment was initiated, or on the following day; carriers were included only if, in addition to the above, they had two or more positive cultures among the three pre-treatment examinations and the one on the morning treatment was started. In the controlled series alternate cases or carriers were given the drug.

[1] From the Division of Infectious Diseases, National Institute of Health, and the Insular Department of Public Health, San Juan, P. R.

Later, with the objective of eradicating the infection from the group, all culturally positive individuals were treated.

It is clearly apparent in table 1 that the infections (in this series due to either the Flexner or Newcastle variety of *Shigella*) were cut short by treatment. Seventy-six percent of the controls remained positive throughout the 10 days of observation shown in the table; during the next 10 days, when most of the patients were examined daily, 6 more became culturally negative. From the known variation in the duration of *Shigella* infections, it is estimated that the remainder gradually ceased to be positive during the following 2 or 3 months. In marked contrast, the last positive finding in the treated alternates was on the tenth day, and there was little persisting infection after the fifth day. The organisms were found regularly in one clinical case up to the seventh day; this case was again positive on the tenth day. A carrier was shown as infected up to the eighth day. His first four cultures were all positive but after the first day of treatment the organisms were found only on the eighth day.

TABLE 1.—*The persistence of Shigella dysenteriae infection in untreated controls and in individuals treated with sulfaguanidine*

Days after beginning treatment	Number and percent of individuals with continuing positive infections											
	Untreated controls				Treated alternates				Uncontrolled treated series		Total treated	
	Cases	Carriers	Total		Cases	Carriers	Total		Number	Percent	Number	Percent
			Number	Percent			Number	Percent				
0	11	18	29	100	13	15	28	100	40	100	68	100
1	9	17	26	90	10	9	19	68	30	75	49	72
2	9	17	26	90	4	3	7	25	17	42	24	35
3	9	17	26	90	2	2	4	14	5	13	9	13
4	9	16	25	86	2	2	4	14	2	5	6	9
5	9	16	25	86	2	1	3	11	2	5	5	7
6	9	16	25	86	1	1	2	7	1	3	3	4
7	9	16	25	86	1	1	2	7	0	0	2	3
8	9	15	24	83	1	1	2	7	0	0	2	3
9	8	14	22	76	1	0	1	4	0	0	1	1
10	8	14	22	76	1	0	1	4	0	0	1	1

This wide variation in the number of continuing positive individuals does not adequately indicate the even more marked difference in the quantity of organisms being discharged. After treatment there was a prompt and striking reduction in the number of suspicious colonies even before the individual became negative. The cultures on the untreated controls usually continued to show large numbers of typical colonies.

The post-treatment stool cultures in this series did not reveal any recurrence of infection.

The uncontrolled treated series included 3 acute and 5 chronic clinical cases and 32 passive carriers. These responded promptly to

treatment. The latest positive culture (from a chronic clinical case) was obtained 6 days after the beginning of treatment.

Having determined that sulfaguanidine would terminate *Shigella dysenteriae* (Flexner and Newcastle) infection in the individual, we then examined the possibility of eradicating it from heavily infected groups. Two adjoining wards of the mental hospital were used for this test. Infected persons were found by culturing 380 of the male inmates. From these the study group of 205 inmates was selected with an approximate ratio of 1 infected to 4 noninfected persons. No general measures of control were instituted and the conditions as they existed were favorable for the spread of infection. Cultures were taken daily on every individual. Treatment of those known to be infected was started on the evening of the fourth day. Others who subsequently yielded organisms giving a positive reaction on Krumwiede's medium were immediately placed under treatment. Sulfaguanidine was given in 5-gram doses 3 times daily for 4 days. Treatment was extended for a longer period if the cultures continued to yield suspicious organisms.

TABLE 2.—*The occurrence of Shigella dysenteriae infection among 205 inmates of a mental hospital, as related to treatment with sulfaguanidine*

Date	Treatment status	Individuals culturally positive			Known infected individuals		
		Infected when admitted to study	Infected after admission to study	Total	Infected when admitted to study	Infected after admission to study	Total
Aug. 25	Pre-treatment	30	0	30	43	0	43
26		38	0	38	46	0	46
27		31	2	33	41	2	43
28[1]		32	5	37	35	6	41
Aug. 29	All known positive cases treated	21	6	27	26	6	32
30		13	3	16	15	4	19
31		5	5	10	5	6	11
Sept. 1		0	6	6	2	6	8
2		2	3	5	2	3	5
3		1	5	6	1	5	6
4		0	3	3	0	4	4
5		0	2	2	0	2	2
6		0	0	0	0	0	0
Sept. 8	Post-treatment	0	1	1	0	1	1
11		0	2	2	0	2	2

[1] Treatment started after cultures were obtained.

The result of this procedure is shown in table 2. All individuals having positive cultures on the survey examination (on August 21) or on one or both of the first two routine daily cultures have been classified as infected on admission to the study. Those negative on these 3 tests but subsequently positive have been classified as infected after admission to the study. Two persons positive on the survey examination had 5 and 7 negative cultures, respectively, before they were again positive. They have been included with the group infected after entering the study. Individuals when positive frequently

yielded the organisms on each daily culture until they became negative. However, several had positive observations interrupted by a single negative finding and 5 cases had 2 consecutive negative cultures in a series of positive tests. Thus the number of infected persons was usually greater than the number of positive cultures on any one day.

Sulfaguanidine was first given on the evening of August 28. After 5 doses the number of positive cultures and of infected individuals was reduced by more than 50 percent, as shown by the findings on August 30. After 3 days, those infected on admission to the study were almost free of infection. The two individuals who remained positive for 2 and 3 days longer were discharging relatively few organisms. On the ninth day after sulfaguanidine was started all individuals had negative cultures. Treatments were discontinued the next day.

Two follow-up examinations were conducted on both wards during the subsequent week. Three positive cultures, as shown in table 2, were found. Previously these persons had been consistently negative. Individuals in one of the two wards were examined 3 more times during the week but no additional positives were discovered. The source of these later infections is uncertain. The attendants were neither examined nor treated. Nearby wards had, concurrently, active cases of bacillary dysentery. Flies caught in these rooms and cultured were found positive for *Shigella dysenteriae*. Screens were lacking. Furthermore, it is possible that one or more in the study group who were culturally negative may nevertheless have been discharging and distributing *Shigella*. Whatever the source of these infections, the treatment rapidly reduced the prevalence of *Shigella dysenteriae*. Had there been no reintroduction it may have successfully eradicated it from the group.

A simplified procedure was used in a military unit in which endemic diarrheal disorders had been persistently annoying. The reported cases were in the hospital. Most of the other men were examined twice before treatment. There were 29 positive cultures in the 291 examinations, a carrier prevalence rate of 10 percent. All persons with positive or suspicious organisms were treated. The subsequent 105 follow-up examinations revealed only 1 infected individual. This man developed mild symptoms (which he did not report) on the day treatment was started. Morbidity reports were not available but, according to the medical officer in charge, the diarrheal disorders which had previously been prevalent disappeared after treatment.

The most recent trial of sulfaguanidine in the control of *Shigella* infections was in an institution for feeble-minded in New York State. During a period of study which continued for 20 months *Shigella dysenteriae* (Sonne) gained entrance and spread widely in each of two groups being observed. The populations averaged 120 and 123,

respectively. Cultural surveys every 2 weeks revealed a persistence of this infection in the groups for 9 and 15 months after it was first discovered. The study was terminated at that time, but 9 months later follow-up examinations were conducted and Sonne infection was still present. There had been no recent illnesses in one group and 1 carrier only was found. Endemic diarrhea persisted in the other and 2 positive cases and 3 carriers were discovered. Those with positive cultures were transferred to the hospital and, under treatment, became and remained negative. All other members of the group have had at least 3 consecutive negative tests. It is believed, therefore, that the infection in the groups was terminated by chemotherapy.

The dosage of sulfaguanidine which we have used has varied but has not been less than 0.3 gm. per kilogram per day for at least 4 days. We have not observed any toxic reactions with even larger doses or more prolonged treatment. At present we are seeking to determine the minimum effective dosage.

Up to the present time we have treated only 6 individuals with Sonne infections, and for these there were no controls. All became culturally negative but only after an average interval which was longer than that in Flexner or Newcastle infections. The effect of sulfaguanidine in the latter infections appears to be well established but our conclusion with respect to Sonne is, at present, guarded. Further evaluation of this treatment in cases or carriers should give attention to the variety of *Shigella* concerned.

COMMENT

General sanitary measures have in the course of years reduced the incidence of infectious diarrheal diseases, which have been found to be predominantly *Shigella dysenteriae* infections. Because these methods of control must be general they can be applied only slowly. Furthermore, under certain conditions they are not effective. The two groups of mentally defective children which we studied lived under excellent institutional conditions. The sanitary quality of the water, milk, and food was carefully guarded, the sewage disposal facilities were modern, and there was close attention to environmental and personal cleanliness. The average annual morbidity from acute diarrhea during the period of 20 months was about 50 percent. The minimum total infection rate for *Shigella dysenteriae* as determined by survey cultures every 2 weeks was approximately one attack per inmate per annum. Clearly the general methods of control were ineffective. The high incidence of secondary infections among household contacts and on hospital wards illustrates further the ability of this infection to spread from person to person even in a "protected" sanitary environment. Under these conditions specific preventive measures are needed.

The wide distribution of these infections at the present time is not generally recognized. Data obtained in appropriate surveys of the general population indicated that the annual attack rate for acute diarrhea, mild or severe, was as high as 50 percent in some communities in New Mexico and Puerto Rico and 20 percent in Georgia. It was found to be very low in New York City. Fecal cultures of clinical cases in New Mexico and Georgia when first examined before convalescence yielded *Shigella dysenteriae* in 75 percent of the severe diarrheal diseases and in 58 percent of the milder disorders. The study in Puerto Rico, where the reported mortality from the diarrheal diseases is very high, has indicated that there are probably more than 100 deaths from *Shigella* infection per 100,000 population per annum. Even in New York City the bacteriological examination of children admitted with acute diarrhea to public pediatric wards frequently revealed positive cases. Where cases were occurring the prevalence of convalescent and passive carriers also was found to be high, as reported in chapter VII.

We did not find in this series any *Shigella* infection which was resistant to sulfaguanidine, but these do occur occasionally. One of us (J. W.) in subsequent studies found a carrier who continued to discharge large numbers of organisms despite the administration of 330 grams of the drug during 22 days of treatment. Suarez and Hernandez (*3*) also reported a case which remained culturally positive, but this person was given only 33 grams *per os* in 4 days and subsequently 55 grams by retention enemas in 7 days.

Chemotherapeutic agents other than sulfaguanidine have not been evaluated as yet. The preliminary report of Poth and Knotts (*5*) on the activity of succinyl sulfathiazole in the bowel is promising. Other sulfonamides have been tried with stated benefit in clinical cases of bacillary dysentery. Comparative studies of chemotherapeutic agents in *Shigella* infections are needed and have been started. Eventually it should be possible to select the most desirable agent on the basis of efficiency, toxicity, and cost.

A practical program for specific control can be determined only through experience but certain conditions make the outlook favorable: (*a*) These preventive measures are most needed in groups readily subject to control, as institutional inmates, men subject to military orders, or families with an infectious enteric disease involving some member, usually a child. (*b*) The individuals most likely to spread infection will be those discharging many organisms. These will be discovered readily by the use of one of the new selective media. The light infections, not so easily identified, will often terminate spontaneously within a short period of time. (*c*) Large numbers of specimens may be obtained with ease in many of the groups which will need to be examined through the use of the rectal swab technique

described in chapter VI. (*d*) Those who are ill will seek or welcome a treatment which will relieve symptoms as it terminates the infection. Carriers who are usually in contact with known cases will not object to a similar medication which is easy to take and does not give rise to unpleasant reactions.

CONCLUSION

The use of chemotherapy in the control of *Shigella dysenteriae* infections has given promising results and warrants adequate trial.

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SULFADIAZINE IN MURINE PERTUSSIS [1]

By JOHN W. HORNIBROOK, *Passed Assistant Surgeon, United States Public Health Service*

Several writers (*1*, *2*, *3*) have indicated that the sulfonamides (sulfapyridine, sulfanilamide, and proseptazine) are of value in the prevention and treatment of pneumonia following whooping cough.

The use of sulfonamides in experimental pertussis in animals is disappointing. Gross (*4*), using intraperitoneal injections of live organisms in mice, found that death was not prevented by the use of sulfanilamide, 4,4′-di (acetylamino) diphenyl sulfone or 4,4′-diaminobenzenesulfonanilide. Cruickshank (*5*) and Bradford and Wold (*6*) injected the organisms intranasally and found that sulfanilamide and sulfapyridine did not prevent death.

By using a modification of the technique of North (*7*) it has been found at the National Institute of Health that sulfadiazine is effective in experimental pertussis.

METHOD

A saline suspension of a 24-hour culture of *H. pertussis* grown on Bordet Gengou medium is made up to a turbidity of 400 parts per million of silica. This is then diluted 1:2500. Mice are anesthetized

[1] From the Division of Infectious Diseases, National Institute of Health.

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with ether and 0.05 cc. of the suspension is dropped in the nose. The inoculation is repeated in one-half to one hour to insure a more uniform distribution of the inoculum in all the mice. At the end of 6 to 9 days the mice are killed with ether, the ventral surface painted with alcohol and an incision made in the neck with a small scalpel. The incision is carried through the trachea and a 24-gauge nicrome wire inserted and pushed down into the lungs. The wire is then streaked on a slant of B. G. medium, incubated 3 days, and examined for *H. pertussis* colonies. The knife is wiped with an alcohol sponge after each operation and the wire is flamed. With a little practice 15 or 20 mice may be cultured in an hour.

The drugs were given subcutaneously in a dose of 0.02 gm. daily. An equal number of treated and control mice were always used.

In recording results, slants with 100 or more colonies were considered positive and slants with less, negative. Grossly contaminated cultures were not counted one way or another.

RESULTS

When the first dose of sulfadiazine was given 1 hour before inoculation the cultures from 19 of 20 mice were negative (1 contaminated). However, 10 of 14 controls were positive.

This experiment, when repeated twice with groups of 10 mice, resulted in essentially the same result.

Tests with sulfaguanidine and sulfathiazole indicate that they were possibly less effective than sulfadiazine. Sulfanilamide appears to be ineffective under these conditions.

When sulfadiazine was started 3 days after inoculation and the mice were killed 7 days after inoculation, no significant reduction in the number of positive cultures resulted. However, when the test animals were cultured on the ninth day after inoculation, only 1 of 10 was positive and all 10 of the controls were positive. Contents of the control tubes were all confluent or semiconfluent, while the sulfadiazine tubes averaged only 35 colonies per mouse.

CONCLUSION

Sulfadiazine reduces the number of *H. pertussis* organisms recoverable on culture from the mouse lung.

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ADMINISTRATIVE ORGANIZATION FOR MENTAL HYGIENE [1]

By VICTOR H. VOGEL, *Passed Assistant Surgeon, United States Public Health Service*

The State has traditionally been responsible for the institutional care of the mentally ill, but it has not kept pace with newer knowledge in efforts to prevent the occurrence of mental illness or its progression to the point where more or less permanent hospitalization is necessary.

It is time to ask ourselves as public health physicians why everything possible is not being done to control this type of illness. It is time to ask ourselves as taxpayers if the problem of the mentally ill is being handled as economically as possible. Many of our mental hospitals are operated as custodial rather than as therapeutic institutions. Most cases entering State hospitals do so without ever having received any preventive attention or early care. This is not good medicine and this is not good common sense unless psychiatry and its handmaiden, mental hygiene, are unable to give assistance (*1*).

Is there a technique which can be economically applied to the problem? There is, and, since it concerns a matter of health, public health agencies should apply it. I refer to the community mental hygiene clinic with accompanying educational and research activities. With mental and emotional disorders furnishing one-half of all disability it is important that each community should have a mental hygiene center where preventive information is disseminated and where early assistance may be obtained. In the field of mental disorders it is impossible and unnecessary to differentiate strictly between prevention and early treatment. Treatment of the behavior problem at the child level may be prevention at the institutional level, and, since institutional care is a State responsibility, the prevention of institutionalization is logically a State interest.

It is difficult to demonstrate statistically that the educational efforts which comprise "pure" mental hygiene prevent the development of mental disorders, or that children seen in mental hygiene clinics would have become, as adults, patients in mental hospitals. It is easier to show that some children are prevented from going to correctional institutions by the efforts of the mental hygiene clinic.

[1] Presented at the first session of the Health Officers' Section, 70th Annual Meeting of the American Public Health Association, October 14, 1941.

It is fairly well established now that at least one-third of all the problems presented to the better child guidance clinics are solved and that another third are improved. Every commitment prevented to a correctional or mental institution probably saves the State $5,000. If this is accomplished in three cases a year, the budget of a mental hygiene clinic is saved.

It was estimated a few years ago in Indiana that if that State's system of community mental hygiene services were extended to cover the entire State, from 15 to 20 percent of patients treated, who would under ordinary circumstances be committed, would not become institutional cases, thus saving the State approximately $583,000 each year. It is estimated that this State could save an additional $284,000 annually by the discharge of approximately 15 percent of the institutional cases if adequate mental hygiene clinics existed for parole supervision (*2*). Two brief case histories from the Indiana service are presented.

Case 1594.—This patient, a 33-year-old housemaid, was referred to the clinic because of extreme nervousness, depression, and mild paranoid ideas. Shortly before coming to the clinic she had been divorced by her husband to whom she had been married for 10 years.

It was the feeling of the referring agency, as well as the psychiatrist, that this patient was progressing rapidly to a mental state which would require commitment and institutional care.

The history shows the patient to have been reared in a home with a step-father and a hostile, rejecting mother who made a particular favorite of the patient's brother. As a child, the patient recalls that she was always contrasted unfavorably with the brother, that she was timid and sensitive, unable to feel part of a group, and never sure of herself. She married rather suddenly a man she had known but a few weeks. After the honeymoon the marital relationship grew progressively more unhappy. The patient was unable to respond to her husband's sexual advances. Finally, the patient ran away with another man who shortly thereafter deserted her.

The examination showed an extremely tense, anxious woman with a depressed mood, a tendency to suspiciousness, and with definite suicidal thoughts. There was evidence of an extreme feeling of guilt and a strong, self-punishing drive.

The patient was treated in the clinic over a period of 4 or 5 months. During this time she released considerable emotion, worked through many of her childhood conflicts, and emerged from treatment a much happier and more stable individual who was able to get and hold a good position much above the level of work she had been doing.

Case 2062.—This patient, a 16-year-old boy, was referred to the clinic because he seemed to be losing interest in his environment, was withdrawing and preoccupied with many rather fantastic ideas having to do with the salvation of the world.

The history showed that this boy was reared by his mother, the father having died shortly after his birth. About 6 months prior to his appearance at the clinic, the boy had been the leader of a very aggressive gang of youngsters who had committed wholesale robberies as well as destroyed property over a rather wide area. The boy had been placed in a detention home for a few months before his symptoms made their appearance.

On examination the boy was found to be extremely apathetic. His eyes had a fixed, glassy look. He talked only in monosyllables and at times his attention seemed miles away from the interview. His thoughts were chiefly concerned with the invention of a perpetual motion machine through which the misfortunes of mankind could be alleviated. The boy had built up in his mind a fantasy of himself as almost a second Messiah. One was able to discern the extreme hostility and feelings of guilt beneath the surface which were the chief factors in producing his acts of delinquent behavior and regressional symptoms. It was the psychiatrist's opinion that this boy was becoming schizophrenic.

A treatment plan was worked out involving removal from the mother and placement in a boarding home in the country. The boy was given intensive psychiatric treatment over a period of 4 or 5 months. He made progressive improvement and worked through a number of his conflicts, and, when discharged from further attendance at the clinic, was functioning in all respects as a happy, normal young man with success in his school and social activities.

This boy would have required institutional care before very long, had not clinic intervention occurred, and it is probable that without the more intensive psychiatric treatment available in the clinic, his placement in an institution would have caused a progressive deterioration.

The good that mental hygiene clinics do is not limited to cases saved from institutions. Persons who may never be in danger of commitment are helped to better emotional adjustments which may, nevertheless, affect their entire lives. Divorces are avoided now and then. Suicides are prevented once in a while. The chronic invalidism of hypochondriasis and other neurotic states may be prevented.

A mental hygiene clinic unit consisting of one psychiatrist, one psychologist, two psychiatric social workers, and a clerk will serve a population of about 100,000. Most mental hygiene clinics are supported by private organizations or Government agencies other than health departments. This has resulted in their being concentrated in the larger centers of population. Very few communities of less than 100,000 persons have mental hygiene service. There are 15 States which have no mental hygiene clinics.

Mental hygiene can grow into an effective weapon only within the framework of a national organization such as the public health facilities, which provide opportunity for correlated development at the Federal, State, and local levels.

The role of the State health department is to stimulate and correlate mental hygiene activities within the State, and arrange part-time traveling clinics for the smaller communities. It should observe and record the epidemiological data which are of growing importance in the field of mental disorders. Organization for mental hygiene in the State health department has been discussed in a previous paper (*3*).

Twenty-two of the 52 State and territorial health departments already have some type of mental hygiene activity. Connecticut has the oldest health department mental hygiene program. Except for Puerto Rico, which administers a large mental hospital, Hawaii has

the largest health department mental hygiene budget, amounting to $46,850, including $10,000 for hospital care of acute cases.

Three States, California, Oregon, and Iowa, have psychiatrists in training to start mental hygiene programs next year. Illinois, Louisiana, Mississippi, Missouri, and North Dakota have less definite plans for substantial mental hygiene programs in the near future. In Maryland the health department cooperates with the mental hygiene society in holding traveling clinics in connection with certain county health units. In New Jersey, where clinics are held by other agencies, the health department employs an advisor in child-parent relations who does educational work among teachers and public health nurses. In New York the health department is assisting financially an $18,000 budget for the newly established Suffolk County mental hygiene unit.

A social hygiene lecturer is employed full-time in Ohio for sex education work with high school students. He gives some private consultation to students who have personal problems. In Texas a program of mental hygiene education for nurses and teachers is carried on through the combined efforts of the maternal and child health and the educational divisions of the health department. The Washington State health department employs as a part-time consultant the secretary of the State mental hygiene society.

The District of Columbia plans to employ two psychiatrists and cooperate closely with the schools in a mental hygiene program. In several States the operation of birth control clinics may be counted as a mental hygiene activity.

In a broad sense, every State engages in mental hygiene work through the distribution of literature and the holding of maternal and child health clinics, and in educational services. However, for an effective program in keeping with the importance of an illness which is responsible for half of all disability, a special full-time mental hygiene department in each State health service is the primary need. The secondary goal is to provide each community which has a health department with the part-time or full-time services of a mental hygiene unit.

Although mental disorders are essentially disturbances of health, social and economic influences are perhaps more important than in other types of disease. Consequently, various other State agencies, including relief and welfare workers, teachers, courts and law enforcement officers and State hospitals are interested in a mental hygiene program. In many instances the lack of a mental hygiene facility to which they can refer cases for consultation has caused them to develop some type of psychiatric or psychological service themselves. Whoever operates a mental hygiene clinic conducts a public service; the mental hygiene division of a State health department should have an advisory board representing the various interested State agencies.

Chief of the difficulties in the rapid achievement of mental hygiene-public health is the lack of trained personnel, particularly psychiatrists, who are familiar with the problems of adult psychiatry and the special practice of mental hygiene and child psychiatry. This makes it necessary, at least at the outset, to pay salaries somewhat higher than in other fields of public health. To provide otherwise adequately trained men with an orientation in public health and child guidance a special 11-month mental hygiene-public health course has been started this year at Johns Hopkins University. It is anticipated that in succeeding years this course will be expanded and that similar courses in other postgraduate schools of public health will be developed.

At the Federal level the Public Health Service is doing a number of things to further mental hygiene. The Service now has in the field a full-time mental hygiene consultant who is assisting in the organization of State mental hygiene programs. This officer serves as a medium of exchange for ideas and techniques developed in the various programs and as a clearing house for the employment of persons qualified for this special type of work.

Mental hygiene projects are considered proper objects of expenditure for title V and title VI Social Security funds obtained through the Maternal and Child Health Division of the Children's Bureau and the Public Health Service. The Service also acts as a public information center on mental hygiene.

A rather complete survey service is offered State hospitals as an aid to their improvement. Two large hospitals for the special treatment of narcotic addiction are operated by the Service. The medical and psychiatric care of Federal prisoners and psychiatric consultation for certain Federal courts is a Service function.

The services of an outstanding authority in industrial mental hygiene have recently been made available through the Division of Industrial Hygiene of the National Institute of Health. A neuropsychiatric research institute patterned after the National Cancer Institute is planned where some of the unsolved problems of nervous and mental diseases may be studied.

The establishment of a comprehensive mental hygiene program need not wait until all or even most of such problems are solved. Troubled people need help now and we know enough to make our efforts at assistance worth-while. If community services are set up now, new techniques can be applied as they evolve without a great lapse of time. This has been the pattern in the development of programs for the control of venereal diseases and other public health problems, and the same principle should apply to mental disorders. If we, as doctors, do not develop mental hygiene techniques in the medical field, how can we reasonably expect them to be handed over to us after they are perfected?

The development of mental hygiene is not only a responsibility of the public health services but an opportunity to give assistance, which is urgently needed and gratefully received, to the public whose health we protect.

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DEATHS DURING WEEK ENDED MARCH 28, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 28, 1942	Corresponding week, 1941
Data from 87 large cities of the United States:		
Total deaths	8,905	8,741
Average for 3 prior years	8,968	
Total deaths, first 12 weeks of year	109,781	113,316
Deaths per 1,000 population, first 12 weeks of year, annual rate	12.9	13.3
Deaths under 1 year of age	624	545
Average for 3 prior years	535	
Deaths under 1 year of age, first 12 weeks of year	6,764	6,418
Data from industrial insurance companies:		
Policies in force	65,017,199	64,588,630
Number of death claims	13,181	12,619
Death claims per 1,000 policies in force, annual rate	10.6	10.2
Death claims per 1,000 policies, first 12 weeks of year, annual rate	10.3	11.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 4, 1942

Summary

The number of cases of meningococcus meningitis increased from 90 to 111, with 30 cases reported in New York (of which 26 occurred in New York City). The number of cases reported for the current week is above that for any corresponding week since 1937, when 189 cases were reported. The largest numbers of cases are being reported currently from the New England, Middle Atlantic, and South Atlantic areas.

The number of cases of smallpox increased from 19 to 35. The current incidence is about the same as for the corresponding week last year (34 cases), the lowest on record, and may be compared with a 5-year (1937–41) median of 328 cases for the week. Of the current cases, Texas reported 18 and Tennessee 5.

All of the other common communicable diseases included in the following weekly table recorded decreases as compared with the preceding week. The current incidence of diphtheria, scarlet fever, typhoid fever, and whooping cough is below that for any corresponding week of the preceding 5 years.

Other diseases reported during the current week include 1 case of anthrax in Pennsylvania, 1 case of leprosy in New York, 11 cases of amebic dysentery, 55 cases of bacillary dysentery (44 in Texas), 32 cases of unspecified dysentery (16 in Virginia), 2 cases of Rocky Mountain spotted fever in the Mountain States, 14 cases of tularemia, and 21 cases of endemic typhus fever. The seasonal rise of Rocky Mountain spotted fever (which starts earlier in the west) has apparently begun, while the period of low seasonal incidence for endemic typhus fever in the United States now obtains.

The crude death rate for the current week for 88 large cities in the United States is 12.0 per 1,000 population as compared with 12.5 for the preceding week and 12.4 for the 3-year (1939–41) average for the corresponding week. The accumulated rate to date is 12.8, as compared with 13.2 for 1941.

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Telegraphic morbidity reports from State health officers for the week ended April 4, 1942, and comparison with corresponding week of 1941 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941	
NEW ENG.												
Maine	1	1	1	----	4	4	173	151	151	4	0	0
New Hampshire	0	1	1	6	----	----	8	86	46	0	0	0
Vermont	0	1	0	----	----	----	70	57	43	0	0	0
Massachusetts	5	9	3	----	----	----	1,085	759	632	7	3	2
Rhode Island	0	0	0	----	----	----	267	7	9	0	0	0
Connecticut	1	9	2	----	5	7	365	209	209	2	1	1
MID. ATL.												
New York	29	18	18	[1] 15	[1] 24	[1] 22	622	8,459	1,467	30	6	6
New Jersey [2]	3	7	6	4	25	11	379	3,326	1,338	5	1	1
Pennsylvania	11	11	35	----	----	----	1,081	5,310	595	5	7	7
E. NO. CEN.												
Ohio	9	7	25	23	35	20	354	9,278	584	1	1	2
Indiana	6	17	10	23	15	16	125	806	137	0	1	1
Illinois	8	25	35	23	16	22	527	3,660	106	1	2	1
Michigan [2]	2	9	10	2	5	5	202	4,727	393	2	3	2
Wisconsin	4	0	1	55	103	103	870	1,649	562	1	0	1
W. NO. CEN.												
Minnesota	0	2	2	----	2	2	693	6	160	1	0	0
Iowa	1	9	7	5	52	14	267	180	160	0	0	0
Missouri	4	5	11	1	4	27	157	299	41	0	1	0
North Dakota	0	3	0	----	3	5	64	33	33	0	0	0
South Dakota	0	1	0	----	1	1	6	16	4	0	0	0
Nebraska	5	3	3	55	1	----	190	42	42	0	0	0
Kansas	1	3	4	12	7	8	646	1,169	526	2	1	1
SO. ATL.												
Delaware	0	0	0	----	----	----	3	319	15	0	0	0
Maryland [2]	1	1	3	5	44	28	780	344	344	5	5	2
Dist. of Col	1	0	1	3	3	2	91	328	69	2	1	0
Virginia	3	10	16	311	388	292	217	2,619	421	3	5	1
West Virginia	6	5	9	22	38	67	209	637	18	3	0	1
North Carolina	8	15	15	26	22	33	1,090	1,680	808	2	1	1
South Carolina	7	8	6	605	415	552	347	647	57	2	4	1
Georgia	5	5	7	45	164	168	263	1,207	172	4	1	2
Florida	4	6	5	1	178	25	260	1,136	186	1	1	1
E. SO. CEN.												
Kentucky	7	9	8	9	84	30	111	1,808	151	4	0	1
Tennessee	2	10	10	44	96	132	129	706	84	1	2	2
Alabama	8	4	5	328	124	172	257	698	175	0	3	3
Mississippi [2]	7	0	3	----	----	----	----	----	----	1	6	2
W. SO. CEN.												
Arkansas	2	4	3	197	276	134	322	332	78	1	3	2
Louisiana	3	2	11	3	11	12	292	94	94	0	1	1
Oklahoma	4	5	5	141	175	162	255	46	46	0	1	1
Texas	39	36	24	1,113	1,232	1,157	2,139	1,127	624	7	3	3
MOUNTAIN												
Montana	0	4	2	5	9	9	150	17	17	0	0	0
Idaho	1	1	1	----	----	2	60	20	20	0	0	0
Wyoming	0	1	1	104	----	1	77	57	43	0	0	0
Colorado	6	9	8	49	35	30	254	397	272	1	0	0
New Mexico	0	2	3	3	----	3	133	197	110	0	0	0
Arizona	0	2	2	151	146	122	206	98	98	0	1	0
Utah [2]	0	0	0	7	69	4	235	13	150	0	0	0
Nevada	0	0	----	----	----	----	9	38	----	0	0	----
PACIFIC												
Washington	0	6	1	1	11	1	286	48	51	3	1	1
Oregon	2	0	2	24	16	36	130	404	58	1	2	0
California	17	21	21	220	349	349	5,470	419	419	9	0	2
Total	223	307	358	3,641	4,187	4,187	21,926	55,665	15,331	111	68	68
13 weeks	4,037	3,826	6566,	61526,	463,725	142,811	204,832	375,811	167,831	953	662	682

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 4, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941		Apr. 4, 1942	Apr. 5, 1941	
NEW ENG.												
Maine	0	1	0	13	10	13	0	0	0	0	0	0
New Hampshire	0	0	0	14	3	7	0	0	0	0	0	0
Vermont	0	0	0	11	19	15	0	0	0	0	0	0
Massachusetts	0	0	0	363	220	220	0	0	0	2	1	0
Rhode Island	0	0	0	19	7	22	0	0	0	1	0	0
Connecticut	0	0	0	30	162	142	0	0	0	0	2	2
MID. ATL.												
New York	2	0	1	498	610	920	0	0	0	6	4	4
New Jersey	0	0	0	117	338	272	0	0	0	1	3	3
Pennsylvania	0	1	1	494	394	406	0	0	0	1	1	5
E. NO. CEN.												
Ohio	2	2	1	414	411	363	0	0	1	0	2	2
Indiana	0	0	0	125	161	202	0	2	3	0	1	2
Illinois	0	0	1	238	466	565	1	1	18	1	1	1
Michigan	1	1	1	219	301	522	0	0	9	0	3	2
Wisconsin	0	3	0	175	154	176	0	15	4	2	0	1
W. NO. CEN.												
Minnesota	0	0	0	89	68	107	0	2	4	0	0	0
Iowa	0	0	0	55	42	112	2	1	34	0	1	1
Missouri	0	0	0	37	120	120	3	1	26	0	0	0
North Dakota	0	0	0	21	4	15	0	0	3	0	0	1
South Dakota	0	0	0	42	27	17	0	1	2	0	0	0
Nebraska	0	0	0	60	38	38	0	0	3	0	0	0
Kansas	0	0	0	105	37	109	0	1	8	0	1	0
SO. ATL.												
Delaware	0	0	0	25	7	8	0	0	0	0	0	0
Maryland	0	0	0	79	38	50	0	0	0	2	1	2
Dist. of Col.	0	0	0	8	14	17	0	0	0	1	0	0
Virginia	0	1	1	18	58	56	0	0	0	0	2	4
West Virginia	0	0	0	39	71	61	0	1	0	4	1	4
North Carolina	0	0	0	27	34	31	0	0	0	1	2	2
South Carolina	1	0	0	2	3	4	0	0	0	6	10	2
Georgia	0	0	0	9	19	13	0	0	0	2	2	3
Florida	0	5	1	8	2	8	0	0	0	2	10	4
E. SO. CEN.												
Kentucky	0	0	0	71	146	89	0	0	0	1	1	6
Tennessee	0	1	1	48	71	67	5	0	1	2	0	2
Alabama	0	0	0	11	20	9	1	0	0	1	0	2
Mississippi	2	1	1	9	9	7	0	0	0	3	2	2
W. SO. CEN.												
Arkansas	0	0	0	5	12	10	2	1	1	0	1	1
Louisiana	0	2	0	4	8	10	2	0	1	5	2	10
Oklahoma	0	0	0	15	21	22	[3]1	3	3	2	1	1
Texas	0	2	2	60	63	63	18	3	3	7	5	7
MOUNTAIN												
Montana	1	0	0	32	37	22	0	0	5	0	0	0
Idaho	0	0	0	2	5	11	0	0	3	0	0	1
Wyoming	0	0	0	19	29	17	0	0	1	0	1	0
Colorado	1	0	0	37	40	40	0	0	7	1	3	1
New Mexico	0	0	0	4	6	14	0	0	0	1	1	0
Arizona	0	1	0	4	5	5	0	0	0	1	0	0
Utah	0	0	0	24	12	19	0	0	0	0	0	0
Nevada	0	0	------	2	0	------	0	0	------	0	2	------
PACIFIC												
Washington	0	0	0	24	17	44	0	2	3	0	1	2
Oregon	0	1	0	12	5	20	1	0	12	0	2	1
California	0	1	1	92	124	195	0	0	9	3	2	4
Total	10	25	23	3,829	4,468	5,188	36	34	328	59	72	98
13 weeks	299	316	279	52,173	49,047	68,971	[3]301	602	3,982	966	989	1,406

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 4, 1942—Continued

Division and State	Whooping cough		Week ended Apr. 4, 1942								
	Week ended—		Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mountain spotted fever	Tularemia	Typhus fever
	Mar. 28, 1942	Mar. 29, 1941		Amebic	Bacillary	Unspecified					
NEW ENG.											
Maine	19	13	0								0
New Hampshire	15	0	0								0
Vermont	35	14	0								0
Massachusetts	196	222	0	0	1	0	0	0	0	0	0
Rhode Island	43	26	0								0
Connecticut	83	72	0	0	1	0	1	0	0	0	0
MID. ATL.											
New York	500	335	0	3	3	0	0	1	0	0	1
New Jersey	180	94	0	1	0	0	0	0	0	0	0
Pennsylvania	180	375	1	0	0	0	0	0	0	0	0
E. NO. CEN.											
Ohio	157	284	0	0	0	0	0	0	0	1	0
Indiana	27	21									0
Illinois	157	81	0	1	0	0	0	0	0	1	0
Michigan	131	426	0	0	3	0	0	0	0	0	0
Wisconsin	146	131	0	0	0	0	2	0	0	1	0
W. NO. CEN.											
Minnesota	23	102	0								
Iowa	27	40	0								
Missouri	2	44	0	0	1	0	0	0	0	0	0
North Dakota	1	16	0								0
South Dakota		27	0								0
Nebraska	3	23	0								0
Kansas	49	170	0	0	0	0	0	0	0	1	0
SO. ATL.											
Delaware	8	6	0								0
Maryland	39	93	0	0	0	2	0	0	0	0	0
Dist of Col	15	18	0								0
Virginia	53	76	0	0	0	16	0	0	0	0	0
West Virginia	16	44	0								0
North Carolina	156	263	0								0
South Carolina	96	111	0	0	0	0	0	0	0	4	2
Georgia	29	22	0	0	0	0	0	0	0	2	5
Florida	23	19	0	0	0	0	0	0	0	0	3
E. SO. CEN.											
Kentucky	101	74	0								0
Tennessee	23	66	0	1	0	0	0	0	0	2	0
Alabama	51	23	0								0
Mississippi			0	0	0	0	0	0	0	1	0
W. SO. CEN.											
Arkansas	7	43	0	3	0	0	0	0	0	0	0
Louisiana	[4]24	3	0	0	1	0	0	0	0	0	2
Oklahoma	9	59	0	0	0	0	0	0	0	0	0
Texas	181	339	0	1	44	0	0	0	0	1	7
MOUNTAIN											
Montana	26	24	0	0	0	0	0	0	1	0	0
Idaho	4	10	0	0	0	0	0	0	0	0	0
Wyoming	3	1	0	0	0	0	0	0	1	0	0
Colorado	55	99	0	0	0	0	0	0	0	0	0
New Mexico	36	26	0	0	0	0	0	0	0	0	1
Arizona	45	38	0	0	0	14	0	0	0	0	0
Utah	30	60	0	0	0	0	0	0	0	0	0
Nevada	8	8	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	90	115	0	0	0	0	1	0	0	0	0
Oregon	29	11	0	0	0	0	0	0	0	0	0
California	283	485	0	1	1	0	0	0	0	0	0
Total	3,414	4,652	1	11	55	32	4	1	2	14	21
13 weeks	[4]50,708	57,421									

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Later information has been received that only 1 case of smallpox should have been reported in Oklahoma for the week ended Feb. 14, 1942. (See footnote 3, p. 364, Public Health Reports of Mar. 6, 1942.)
[4] Delayed report of 7 cases included.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 21, 1942

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	1	1	1	0	4	0	4	0	0	0
Baltimore, Md	4	0	1	1	427	6	28	0	11	0	0	23
Barre, Vt	0	0	------	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	------	0	0	0	1	0	0	0	0	0
Birmingham, Ala	0	0	24	4	5	0	7	0	8	0	0	1
Boise, Idaho	0	0	------	0	3	0	0	0	0	0	0	2
Boston, Mass	0	0	------	0	118	3	19	0	91	0	1	55
Bridgeport, Conn	0	0	------	0	10	0	2	0	1	0	0	0
Brunswick, Ga	0	0	------	0	19	0	0	0	1	0	0	0
Buffalo, N. Y	0	0	------	0	28	0	6	0	23	0	0	2
Camden, N. J	2	0	------	0	4	0	1	0	19	0	0	0
Charleston, S. C	0	0	50	1	0	0	2	0	0	0	0	3
Charleston, W. Va	0	0	------	0	0	0	0	0	0	0	0	0
Chicago, Ill	12	0	7	2	123	1	30	0	97	0	1	92
Cincinnati, Ohio	0	0	------	0	2	0	9	0	31	0	0	19
Cleveland, Ohio	0	0	15	1	11	1	11	0	83	0	1	14
Columbus Ohio	1	0	------	0	9	0	6	0	3	0	0	6
Concord, N. H	0	0	------	0	0	0	0	0	0	0	0	0
Cumberland, Md	0	0	------	0	4	0	0	0	0	0	0	0
Dallas, Tex	2	0	2	1	268	0	7	0	2	0	0	2
Denver, Colo	6	0	20	0	122	0	2	0	5	0	0	10
Detroit, Mich	8	0	1	2	67	0	17	0	110	0	1	76
Duluth, Minn	0	0	------	0	0	0	0	0	16	0	0	0
Fall River, Mass	0	0	------	0	17	0	1	0	40	0	0	0
Fargo, N. Dak	0	0	------	0	0	0	0	0	0	0	0	0
Flint, Mich	0	0	------	0	2	0	4	0	3	0	0	0
Fort Wayne, Ind	0	0	------	0	1	0	5	0	1	0	0	0
Frederick, Md	0	0	------	0	52	0	1	0	2	0	0	0
Galveston, Tex	0	0	------	0	6	0	1	0	0	0	0	0
Grand Rapids, Mich	0	0	------	0	3	0	1	0	3	0	0	1
Great Falls, Mont	0	0	------	0	39	0	2	0	1	0	0	0
Hartford, Conn	0	0	------	0	25	3	0	1	0	0	0	0
Helena, Mont	0	0	------	0	0	0	0	0	0	0	0	7
Houston, Tex	3	0	------	0	55	0	10	0	1	0	1	0
Indianapolis, Ind	2	0	------	1	55	0	11	0	32	0	0	17
Kansas City, Mo	0	0	------	0	35	0	5	0	34	0	0	2
Kenosha, Wis	0	0	------	0	1	0	0	0	4	0	0	6
Little Rock, Ark	0	0	12	0	107	0	1	0	0	0	0	0
Los Angeles, Calif	2	0	17	0	637	0	16	0	29	0	1	20
Lynchburg, Va	0	0	------	0	0	0	3	0	2	0	0	10
Memphis, Tenn	0	0	11	0	14	0	5	0	8	0	0	2
Milwaukee, Wis	0	0	------	0	71	0	0	0	40	0	0	57
Minneapolis, Minn	1	0	------	0	182	0	2	0	16	0	0	5
Missoula, Mont	0	0	------	0	0	0	0	0	2	0	0	0
Mobile, Ala	0	0	------	2	2	0	5	0	0	0	0	0
Nashville, Tenn	0	0	------	2	0	0	3	0	3	0	0	8
Newark, N. J	0	0	4	0	104	1	5	1	23	0	0	35
New Haven, Conn	0	0	------	0	247	1	0	0	0	0	0	15
New Orleans, La	3	1	1	0	22	1	0	1	3	0	1	0
New York, N. Y	23	0	11	4	59	18	68	0	331	0	1	243
Omaha, Nebr	1	0	------	0	201	0	2	0	3	0	0	1
Philadelphia, Pa	1	0	1	0	34	1	30	0	277	0	1	76
Pittsburgh, Pa	3	0	------	3	23	1	14	0	13	0	0	15
Portland, Me	0	0	------	0	6	4	2	0	4	0	0	1
Providence, R. I	0	0	1	0	109	0	4	0	7	0	0	18

City reports for week ended March 21, 1942

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Pueblo, Colo	0	0	------	0	12	0	3	0	3	0	0	2
Racine, Wis	0	0	------	0	17	1	0	0	1	0	0	11
Raleigh, N. C	0	0	------	0	1	0	1	0	1	0	0	2
Reading, Pa	0	0	1	1	2	0	1	0	3	0	0	2
Richmond, Va	0	0	1	1	0	0	4	0	3	0	0	0
Roanoke, Va	0	0	------	0	0	0	0	0	1	0	0	3
Rochester, N. Y	0	0	------	0	6	0	3	0	8	0	0	9
Sacramento, Calif	2	0	1	1	100	0	5	0	2	0	0	5
Saint Joseph, Mo	0	0	------	0	7	0	7	0	3	0	0	0
Saint Louis, Mo	2	1	------	0	227	0	15	0	18	0	0	4
Saint Paul, Minn	1	0	------	0	547	0	3	0	12	0	0	15
Salt Lake City, Utah	0	0	------	0	7	0	1	0	6	0	0	21
San Antonio, Tex	7	0	4	0	15	0	9	0	2	0	0	4
San Francisco, Calif	0	1	1	0	35	0	13	0	9	0	0	0
Savannah, Ga	0	0	36	2	53	0	1	0	1	0	0	0
Seattle, Wash	0	0	------	2	6	1	5	0	4	0	0	42
Shreveport, La	0	0	------	0	8	0	3	0	1	0	0	0
South Bend, Ind	0	0	------	0	0	0	1	0	19	0	0	0
Spokane, Wash	0	0	------	0	8	0	3	0	2	0	0	2
Springfield, Ill	0	0	------	0	171	0	1	0	12	0	0	0
Springfield, Mass	0	0	------	0	10	0	4	0	26	0	0	6
Superior, Wis	0	0	------	0	0	0	0	0	2	0	1	12
Syracuse, N. Y	0	0	------	0	46	1	1	0	5	0	1	30
Tacoma, Wash	0	0	------	0	0	0	0	0	0	0	0	2
Tampa, Fla	0	0	------	1	11	0	6	0	0	0	2	0
Terre Haute, Ind	0	0	------	0	5	0	4	0	2	0	0	1
Topeka, Kans	0	0	------	0	1	1	1	0	2	0	0	7
Trenton, N. J	0	0	2	1	4	0	4	0	7	0	0	10
Washington, D. C	0	0	5	2	83	1	17	0	16	0	0	15
Wheeling, W. Va	0	0	------	0	14	0	2	0	2	0	0	0
Wichita, Kans	0	0	1	0	47	0	3	0	0	1	0	2
Wilmington, Del	1	0	------	1	2	0	5	0	13	0	0	0
Winston-Salem, N. C	0	0	1	0	102	0	4	0	4	0	0	0
Worcester, Mass	0	0	------	0	18	0	3	0	5	0	0	50

Dysentery, amebic.—Cases: Detroit, 2.
Dysentery, bacillary.—Cases: Camden, 1; Cleveland, 1; Los Angeles, 2; New York, 3; Syracuse, 2.
Leprosy.—Cases: New Orleans, 1.
Tularemia.—Cases: New Orleans, 1.
Typhus fever.—Cases: Birmingham, 1.

Rates (annual basis) per 100,000 population for the group of 89 cities included in the preceding table (estimated population, 1942, 34,058,143)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended Mar. 21, 1942	13.32	36.59	5.66	749.42	72.88	242.20	0.15	1.99	168.56
Average for week 1937–41	16.54	83.45	14.68	1292.40	109.26	287.90	4.02	3.86	181.27

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 7, 1942.—During the week ended March 7, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		3	4		7				1	15
Chickenpox	1	15	3	220	288	70	21	36	222	876
Diphtheria	5	17	2	19	6	8	1			58
Dysentery				4						4
Encephalomyelitis				1						1
German measles		6		33	74	9	20	10	58	210
Influenza		16			4				32	52
Measles		13	4	577	179	203	20	19	51	1,066
Mumps			5	515	360	162	70	100	620	1,832
Pneumonia	5	5			22	2			10	44
Poliomyelitis			2						1	3
Scarlet fever	2	6	7	118	306	50	17	56	30	592
Trachoma						1			1	2
Tuberculosis	1	21	14	61	34		7	1		139
Typhoid and paratyphoid fever			2	6	3				1	12
Undulant fever					1				1	2
Whooping cough	2	23	1	159	44	3	4	4	26	266
Other communicable diseases	8	16		2	190	43	6	2	9	276

CUBA

Provinces—Notifiable diseases—4 weeks ended February 28, 1942.—During the 4 weeks ended February 28, 1942, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	2	1	9		12	26
Chickenpox					3	3	6
Diphtheria	3	31	1	2		1	38
Hookworm disease		16					16
Leprosy		1			6	3	10
Malaria	194	37	2	13	5	617	868
Measles		47	3				50
Scarlet fever		2					2
Tuberculosis	29	67	21	41	26	31	215
Typhoid fever	9	66	4	26	7	20	132
Yaws						3	3

[1] Includes the city of Habana.

FINLAND

Communicable diseases—November 1941.—During the month of November 1941, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	118	Poliomyelitis	3
Influenza	994	Scarlet fever	226
Paratyphoid fever	42	Typhoid fever	62

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Indochina (French).—For the period February 11 to 28, 1942, 17 cases of plague were reported in French Indochina. For the first 10 days of March 1942, 13 cases of plague were reported in the same place.

Typhus Fever

Algeria.—For the week ended February 28, 1942, 1,912 cases of typhus fever were reported in Algeria, including 100 cases in Algiers and 39 cases in Oran.

Irish Free State—County Wicklow—Tinahely—Knockshanrock.—For the week ended March 14, 1942, 2 fatal cases of typhus fever were reported in Knockshanrock, Tinahely, County Wicklow, Irish Free State.

Morocco.—During the week ended March 14, 1942, 988 cases of typhus fever were reported in Morocco (983 cases in the preceding week).

Rumania.—During the week ended March 21, 1942, 171 cases of typhus fever were reported in Rumania, as compared with 161 cases reported in the preceding week.

Spain.—For the week ended February 28, 1942, 328 cases of typhus fever were reported in Spain, including 67 in Madrid, 11 in Seville, and 42 in Barcelona.

Tunisia.—For the week ended February 21, 1942, 616 cases of typhus fever were reported in Tunisia, including 87 cases in Tunis. During the week ended February 14, 651 cases (34 in Tunis) were reported.

COURT DECISIONS ON PUBLIC HEALTH

Liability for sale of contaminated beverage.—(Georgia Court of Appeals, Division No. 1; *Crosby et al.* v. *Calaway*, 16 S.E.2d 155; decided July 8, 1941.) In an action brought for injury alleged to have resulted from drinking a bottled beverage which was contaminated, the Georgia Court of Appeals, in the course of its opinion, referred to the following section of the State code: "Any person who knowingly or carelessly sells to another unwholesome provisions of any kind, the defect being unknown to the purchaser, by the use of which damage results to the purchaser or his family, shall be liable in damages for such injury." The court said that this did not apply to clerks or agents who were not shown to have undertaken to perform the duty of inspection required of distributors or retailers. "We think this section is applicable to principals and not agents."

In closing the opinion the court stated that an agent or clerk in a retail store, who merely passed out the articles and received the price for the principal, was not liable for defects in the article sold unless he had actual knowledge of the defects, or unless he assumed the responsibility which the law placed upon retailers and distributors of food, or unless he owed some particular duty to the purchaser. "Before an agent becomes liable for an act or omission alleged to have constituted negligence with resultant injury it must appear that such agent agreed to perform such act for his principal, or had assumed to perform it."

Death from disease caused by bacillus enteriditis held compensable under workmen's compensation act.—(Utah Supreme Court; *Andreason et al.* v. *Industrial Commission et al.*, 100 P. 2d 202, decided March 13, 1940; rehearing denied May 31, 1940, 102 P. 2d 894.) An employee of an animal by-products company, whose duties consisted of skinning and butchering animals, died as a result of contracting a disease attributed to bacillus enteriditis. His widow sought compensation under the Utah workmen's compensation law for herself and her minor children. The illness from which the employee died was uncommon and rare, and there were no other known cases in the State. The disease was one that was acquired from contact with diseased animals or diseased meat. There was no evidence that the deceased came in contact with any diseased animals except at his work. The statute provided for compensation for the injury or death of an employee "by accident arising out of or in the course of his employment." The law also stated that "personal injury by accident arising out of or in the course of employment" should "not include a disease, except as it shall result from the injury." The Utah Supreme Court said that two questions confronted it, namely, was the disease an accidental

injury, and, if so, was it contracted in the course of the deceased's employment. These questions were answered in the affirmative.

The court was of the opinion that under the compensation law an injury arising out of an accident was not limited in meaning to the result of the application of physical force to the body of the injured. An accidental injury might well be expressed as a disability happening by chance or unexpectedly but must, however, be connected with the employment. We do not wish to imply, said the court, that, because one becomes ill while at work, the statute applies to him, even though it may be that he became ill unexpectedly. "That alone is not sufficient to make this case one of an accidental injury. There must be a causal connection between his employment, or his place of employment, and his illness—something which happened to him in the performance of his duties, or some contact he made at his place of employment while on duty there—which forms the connecting link between his employment and the contraction of the illness. And, we might add, which is not an occupational disease." Respecting the legislative provision, above-mentioned, relative to personal injury by accident not including disease, the supreme court referred to one of its prior decisions in which it had been stated that the purpose of the legislature in so enacting was to eliminate occupational diseases.

Relative to the evidence, the court stated that it believed that there was only one reasonable inference to be drawn and that was that the deceased contracted the disease in the course of his employment.

The court held that, so far as the questions submitted to it were concerned, the dependents of the deceased were entitled to compensation.

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